

Dear Berndt,

In this letter we wish to express our concerns and ideas about the physics programs at RHIC prior to EIC. We heard from STAR Management that you have recently presented a plan in which the STAR experiment will be shut down after the BES-II, prior to the completion of the RHIC science mission. Such a step, if executed, will impact the field and high-energy heavy ion researchers worldwide. Hence, we have had extensive discussions among close colleagues and leaders from the most active HI groups in the STAR collaboration. Below I summarize our thoughts.

In order to have *strong and healthy physics programs at RHIC, to maintain the community and to ensure a smooth transition to the future EIC facility*, we urge you to support a program that includes both sPHENIX and a modestly upgraded STAR experiment during the period 2021-2022. We consider this essential for the following reasons:

1) Important physics demands independent verification. The sPHENIX physics program is important, as many have argued. The ‘multiple-experiment model’ has been followed without exception at all major accelerators for generations, including at RHIC over 15 years. We should not abandon it.

2) STAR has a well-understood instrument and is a productive collaboration with a plan through the completion of the RHIC scientific mission. The instrument can be upgraded in a cost effective manner and bring new capability to strong physics programs at both mid- and forward-rapidity. A faster HFT will bring open-bottom-hadron measurements in focus at RHIC. This program is complementary to both the mid-rapidity jet program at sPHENIX and the LHC heavy flavor program. STAR’s forward-rapidity program, utilizing a combination of existing hardware and EIC R&D components, will allow new measurements with polarized p+p and p+A collisions *in a cost effective manner*. This will not only provide new insights in saturation physics and the role(s) of spin in QCD, but also enable the heavy-ion community to engage in science and instrumentation that is closely related to that at a future EIC.

sPHENIX does not currently have measurement capability at forward-rapidity, rather, this could present a costly additional upgrade. STAR’s approach will use both existing apparatus at mid- and forward-rapidity, and modest upgrades. In addition, the two-experiment approach will much reduce the inevitable risks associated with newly-built detector systems. The flexibility brought by continued STAR operations will assure the success and timely completion of the full program at RHIC.

Each of us fully supports the sPHENIX + STAR programs after BES-II, that is, RHIC beam operations with two IRs to complete the RHIC mission. We believe this is the path that will lead us to success in completing the RHIC program. Failure to do so will put the entire heavy-ion community into jeopardy and quite possibly also the EIC.

The success at RHIC has been due to a vibrant and effective collaboration of scientists

from many institutes and countries for more than 15 years. All of us are interested to discuss with you directly regarding scientific pros and cons for shutting down STAR prematurely. If possible, we would like to discuss this important matter with you face to face at your earliest convenience.

Best regards,

A handwritten signature in dark ink, appearing to be 'Nu Xu', with a stylized, cursive script.

Nu Xu

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